Keys to Joint Task Force Decision Making During Current Operations

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Abstract

The U.S. Army Research Laboratory (ARL) recently completed a cognitive study of the decision making process **during current operations** at the brigade and battalion Task force levels. The ARL study first presents a commander-staff group process model as a framework, then develops an integrated cognitive model. The integrated model synthesizes key features of four major decision models developed by prominent cognitive psychologists within the "naturalistic decision making" community. The implications are far-reaching. Insights from the study point strongly in the direction of developing tactics, techniques, and procedures (TTP) for tactical operations centers during current operations. The study also explains persuasively why, in time-constrained circumstances, a commander-directed single COA, vice multiple options, is a prudent and successful method of decision-making. The authors link the cognitive model to a requirement that Opposing Forces (OPFOR) doctrine be developed to support the training of units for "operations other than war." A sub-set of this effort would be the development of intelligence preparation of the battlespace (IPB) techniques to enhance visualization of the enemy force during OOTW contingencies. Finally, the authors urge that similar studies be initiated of current operations decision making within Joint Task Force headquarters. The studies have the potential to leverage significant improvement in the training of officers to serve in JTF headquarters. The authors also urge the Joint doctrine community to underwrite efforts to develop a body of Opposing Forces doctrine for OOTW contingencies.

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1. **Statement of the Opportunity**

Two indirectly related long terms efforts . . .

> . . . the emphasis by successive Chairmen of the Joint Chiefs of Staff to develop and publish Joint doctrine . . . and the
>
> . . . expanding wealth of insight into the cognitive dimensions of military decision-making . . .

. . . have the potential to intersect. When they do, the product should be a closely knit set of doctrine, tactics, techniques and procedures—as well as training support materials—intended to significantly enhance decision-making **during current operations** across the full range of 21st Century contingency operations.

2. **Background**

This paper links recent work by the Army Research Laboratory to what we believe should be joint requirements for more detailed study in two areas not currently listed in the CCRP's "Command Decision Making" research thrust. The two are:

- Decision-making during current operations
- Profiles of hypothetical threat forces (necessary to train for key OOTW contingencies.[1]

2.1 ***Cognitive Elements of Decision Making***

The paper draws from tentative insights produced by ARL's study of the cognitive elements of tactical decision-making during current operations [Leedom, *et al*., 1998]. The study supports the Army's broad DOTLMS-based effort to field an integrated Army Battle Command System (ABCS).[2] As suggested by the title . . .

Cognitive Engineering of the Human Computer Interface for ABCS

. . . the principal task was to promote the integration of the cognitive elements of decision-making into the continuing development of the Army Battle Command System (ABCS).

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[1] For purposes of this paper, a threat profile has two elements. One is a description of the methods the threat uses to pursue its objectives. The best example is the effort the Army has expended in developing the "opposing forces," which are modeled in most respects on the late 1980's Soviet style tank and mechanized forces. The threat profile is complete with units, equipment, organization, doctrine, tactics, techniques, and procedures. The "opposing force" threat profile, with the related "Intelligence Preparation of the Battlefield (IPB)" technique facilitates exceptionally high quality intelligence training and participation in Army exercises. Second, the profile should include an IPB-like technique with which to graphically portray enemy capabilities, alternative courses of action, and intentions. In certain OOTW environments, insurgency for instance, and peacekeeping operations (in regions riven by deeply ingrained ethnic or religious animosities, or both), conceptually sound visualization techniques will be challenging to develop.

[2] On the technical side, ABCS is comprised of the steadily evolving ATCCS (Army Tactical Command and Control System), a complex assembly of hardware, software, and networks, as well as other communications systems. On the human side, ABCS will be comprised of the doctrine, tactics, procedures, and training necessary to optimize the total system. the ARL cognitive engineering studies support both the technical and the human sides of the ABCS development effort.

The study was conducted during the period October 1997 through June 1998. In addition to a comprehensive literature search, the members of the study team participated as observers in four Army Warfighting Experiments (AWEs). They drew heavily on the extensive work by a number of cognitive psychologists investigating "naturalistic decision-making (NDM)." The study presents an **integrated cognitive model** of the decision-making process and a related **commander-staff group process model**. The cognitive model is one of the first to specifically describe decision-making practices during current operations at the brigade level. The process model is also one of the few models to describe (albeit simply) the decision-making activities between the commander and staff to adapt their plan during current operations to a rapidly changing situation. Although the Army has developed a highly articulated system for decision-making during the planning phase of an operation—described in detail in FM 101-5—the study team found few doctrinal and military research descriptions of the decision-making process during current operations.

2.2 *Other Influences on Decision Making*

The Army has institutionalized two other processes that significantly influence decision-making during current operations. The first is Intelligence Preparation of the Battlefield (IPB), the second is the After Action Review (AAR) process. These insights crystallized during the development of the integrated cognitive model. Army commanders and their staffs routinely use IPB as a means of visualizing the enemy situation. IPB starts during the planning phase, and is continuously updated during the execution phase.[3] IPB is considered to be a significant source of the shared mental model most Army officers have of a Soviet-style threat force. The importance of IPB in Battlefield Visualization is captured in the "images" discussion of the integrated cognitive model.

2.2.1 *After Action Reviews (AAR)*

The After Action Review (AAR) process also contributes to the "images," specifically to the ability of Army officers and senior NCOs to visualize the dynamics on the battlefield as the protagonists react to each other's initiatives. Years of participation in AARs may even instill a degree of uniformity in the manner in which Army leaders as a group "see" a battle or engagement unfolding. The AAR process is over ten years old and well ingrained in Army training. The AAR is a facilitated discussion that carries the training unit through a series of questions:

- What was supposed to happen, that is, what was the plan?
- What actually happened?
- What was right or wrong with what happened?
- How should it be done differently next time? [4]

[3] FM 34-130, Intelligence Preparation of the Battlefield
[4] The questions are modified slightly from the wording in FM 25-101, "Battle Focused Training," 30 Sep 1990

The officer who acted as the opposing force (OPFOR) commander during the exercise is normally included in the AAR to provide insights on

- OPFOR doctrine and plans.
- The unit's actions.
- OPFOR reactions to what the unit did.

Important with respect to current operations decision-making, the sequence of the AAR ensures that the training unit literally superimposes their operations order over the enemy's most likely COA, and reviews the chronology of the battle from the viewpoint of the BLUFOR and OPFOR. With the IPB process continuously updated throughout a training exercise, and with the AAR as the final training event, Army officers and senior NCOs are uniformly well conditioned to seeing opposing plans superimposed, and the opposing dynamics unfold as the plans are executed. As described later, these complementary processes and the differences between actions planned and actions executed are essentially tactical deltas. We believe the understanding of the deltas contributes significantly to decision-making during current operations. The point which will be emphasized below is that the understanding of OPFOR doctrine and IPB techniques for graphically representing this doctrine are important images.

2.2.2 *Opposing Force (OPFOR) Doctrine and Intelligence Preparation of the Battlefield (IPB)*

The training materials currently used to describe an enemy force are largely oriented toward Soviet-style mechanized forces. Notwithstanding, the principles underlying the IPB methodology are clearly applicable to other types of threat conventional forces, and equally important, to threat forces that might be encountered in Operations Other Than War (OOTW). This, coupled with the implications of the "images" discussion, illuminates two questions: (1) Why don't we develop threat doctrine for OOTW scenarios? (2) Why don't we develop the related IPB template like graphics to support Battlefield Visualization during OOTW contingencies? We address these questions in paragraph 3.4.

Related to the decision-making models and to the use of IPB to visualize the enemy situation, we note that traditionally, the Army and the Marine Corps have allowed commanders to prescribe their own detailed operating procedures to be used within their tactical operations centers (TOCs). As a result, little if any standardization in TOC procedures exists among brigades/regiments and battalions in the same division. But increasingly, the complexity of employing 21st Century weapons and C2 systems appears to be contributing to the idea that it may be time—if not to standardize procedures—to identify the optimum, generic procedures to support decision-making during current operations. At the Joint force level, CJCSM 3500.05, "JTF Headquarters Mission Training Guide," already identifies the tasks which must be accomplished within a JTF headquarters. In paragraph 3.3, we present the case for advancing the tasks one step further--to develop generic commander–staff procedures to guide decision-making during current operations.

3. **Discussion**

We believe that the Joint Services need to focus research and doctrinal efforts on two vital components of Joint training and readiness for 21st century contingency operations:

- Decision-making during current operations, to include Joint TTP for current operations
- Profiles of hypothetical OPFOR forces (necessary to train for conventional and OOTW contingencies.

To support this view, we present information from the ARL cognitive engineering study and other materials developed during and subsequent to the study effort. The discussion highlights these topics:

- Commander-Staff Group Process Model
- Integrated Cognitive Model
- Tactics, Techniques and Procedures (TTP) for Decision Making During Current Operations
- Generic Threat Doctrine (for training) and Related IPB Techniques

3.1 ***Commander - Staff Group Process Model***

The main effort in the ARL study was the development of the Integrated Cognitive Model. The study participants discovered that a <u>doctrinal process</u> model for decision-making during current operations did not exist.[5] The study team decided it was desirable to develop a group process model in order to frame the cognitive decision-making process. In effect, the development of the Commander-Staff Group Process Model was a supporting effort necessitated by the absence of a doctrinal model. In this paper also, we describe the group process model is described first in order to better frame the cognitive model. The group process model, comprised of Figures 1, 2, and 3, is still a "work in progress."

Work on this model began shortly after the first Army Warfighting Experiment(AWE), the FORCE XXI Division AWE at Ford Hood, TX in October-November 1997.[6] Team members studied the considerable work which had been accomplished by the U.S. Army Research Institute for the Behavioral and Social Sciences (ARI). This work focused on decision-making during the planning phase of an operation, not during the execution phase [Fallesen, *et. al*, 1992, Fallesen, 1993]. The literature review also uncovered U.S. Army Command and General Staff College masters theses addressing the decision-making process, but again, these focused on planning phase decisions as opposed to execution phase decisions [Farris, 1995, Kievennar, 1997]

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[5] The closest the study team came to a doctrinal model is the discussion in Chapter 6 of FM 101-5 *Staff Organization and Operations*. The discussion is, in fact, a general discussion, not a process model as such. It is telling with respect to the decision-making process which always involves a commander that the discussion is found in an FM titled "Staff Organization and Operations" and that the title of the chapter is "Staff Officer Duties During Preparation and Execution of Operations." The study team found two other ARI reports that bear on decision-making during current operations, but are not focused on the subject. One contains a cognitive model; the other contains a flow chart diagram of command and control tasks to be performed during current operations. No manual exists at present that discusses decision-making by commanders during current operations.

[6] A major objective of the AWE was to test the progress the developers had made on the Army Battle Command System (ABCS). Battlefield visualization, relevant common picture, and situational awareness were major themes running through the AWE. The conflict around which the scenario was developed was set in the 2002-2005 timeframe.

3.1.1 *Decision Making as Observed During the AWEs*

The team member attending the first AWE described the brigade commanders' decision making processes during current operations essentially as follows: the decision-making method depended on the amount of time the commanders sensed they had to make and issue their decisions to the subordinate units. Though supported by competent staffs, the two commanders generally tended to think in terms of a single COA. They would describe the COA to their staff, and receive verbal input back from their officers. The commander would reach a final decision based on all the input, then issue the decision, normally as a truncated concept of operations with specific tasks for the subordinate units directly involved. Few instances were observed in which two or more COAs were proposed, developed, and analyzed on even a cursory level. If time permitted, the staffs would conduct a cursory wargame to facilitate timing and synchronization. When time was considered to be very critical, the staff converted the decision to appropriate fragmentary orders without attempting to wargame the COA inherent in the decision, and the orders were issued quickly to the subordinate units. Thus it was reassuring in reading the ARI reports and the CGSC theses immediately after the first AWE to see that the researchers had already described the advantage, in time-constrained situations, of the commander outlining a single best course of action to his staff, and making his final decision(s) based on the refinements they recommended.

The second AWE was conducted by the Mounted Maneuver Battle Laboratory, Fort Knox, KY. Focusing on nature of mounted warfare in the period 2010 – 2015, this experiment assumed that future C4ISR systems will afford the commander a very high level of situational awareness. The objective was to study the impact of this level of situational awareness on a reengineered battalion task force command group. In effect, relying on exceptionally capable sensor systems, the commander and his staff had "near-perfect" situational awareness, that is, they could "see" all their own vehicles, and depending upon the placement of their sensors, they could "see" nearly all the enemy vehicles as well.[7]

Notwithstanding the greatly enhanced situational awareness, the team observed the same general method of decision-making in the second AWE. The markedly different levels of situational awareness afforded by the different C4ISR systems used in the two AWEs appeared to affect the degree and nature of commander-staff interaction during decision making, but not the actual process of decision making. Shortly after the second AWE, the team modified an initial diagram the military SME had developed after the first experiment, incorporating the obvious monitoring and assessment aspects described in the cognitive literature, and the insights of the first two AWEs. The result was a Commander-Staff Group Process Model similar to Figure 1 on the following page. Figure 1 evolved to its present form based on additional insights gained during the third and fourth AWEs.[8] The monitoring and assessment activities outlined in the figure

[7] The MMBL simulated a battlespace environment with "near perfect" this level of situational awareness through a very imaginative use of the modified semi autonomous forces (ModSAF) system.

[8] The third AWE was the annual end-of-year command post exercise conducted by the U.S. Army Command and General Staff College, an exercise called "Prairie Warrior." PW98 was designed around a conventional scenario in the 2002-2005 time frame. The AWE designation relates to the use by the CGSC students of several components of the ABCS. The student officers assigned to battalion, brigade, and division command positions for the exercise were not as experienced as the officers in the FORCE XXI Division AWE, but based on their year-long immersion in doctrine and tactics, and on their own levels of experience, their actions in decision making situations were considered to be useful in analyzing the cognitive processes at work.

represent both the dialogue among the commander and staff to make sense of the situation and the cognitive activities of each individual in the group.

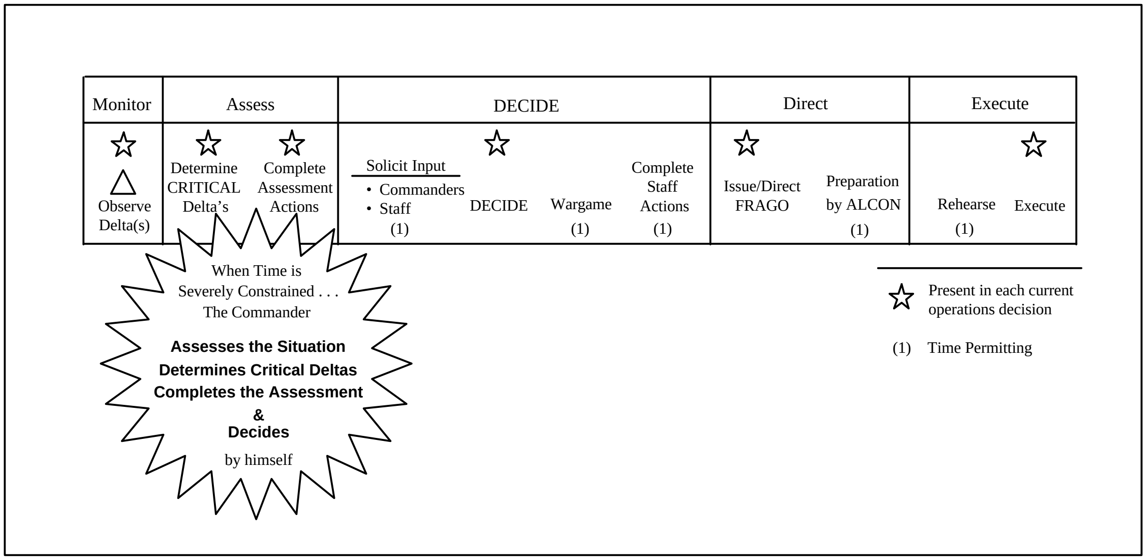

Figure 1. Commander-Staff Group Process Model

By the end of the fourth AWE, the team observed that in situations with a high level of situational awareness ("near perfect"), commanders tend to make decisions with little or no input from the staff prior to the decision. Conversely, in situations with lesser levels of situational awareness, commanders needed and expected much more input from the staff to assist them in making sense of the situation. The team also recognized that the type of decisions ranged from a minor adjustment to a subordinate unit's task or purpose or both, to a total revision of the concept of operations.

3.1.2 *Monitor, Assess, and Decide*

Information received by the commander from his staff and through the C3I system ranged from pieces of raw data to clear concepts implying or describing a sequence of activities. The information covered each Battlefield Operating System (BOS)—a significant range of information.[9] He received it visually, aurally, and in writing. Visual information was displayed on maps, overlays, various briefing graphics, and computer monitors. Aural information was received and given in person-to-person communications, to include transmissions over the tactical radio nets. Written information was received in messages, written orders and reports, briefing charts, etc.

The officers actively tracked what is described in FM 101-5, Chapter 6, as the monitoring of "variances, expectations and wargaming forecasted changes, deviations." But, significantly, the

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The fourth AWE was a second TOC reengineering experiment at the MMBL. It was similar in design to the earlier MMBL experiment.

[9] The tactical level Battlefield Operating Systems Include: maneuver, fire support, air defense, command and control, intelligence, mobility and survivability, and combat service support.

ARL team did not see a formally organized method for this tracking activity or for developing and disseminating the specific information within the groups.

In this framework, the team identified and defined four elements at work in the current operations decision process: tactical deltas, situational deltas, assessment activities, and critical indicators. The team defined the terms as follows:

3.1.2.1 *Tactical Delta(s)*

For purposes of the monitoring—assessment—decision sequence in Figure 1, tactical deltas refer principally to friendly and enemy unit locations, and to key aspects of the unit's current situation. The delta is the difference between the location at which a friendly unit was expected to be at a point in time based on the plan, and the location it is perceived to be based on reports received through the unit's C3I system. The enemy delta is the difference between the location the unit was expected to be at a point in time based on the intelligence preparation of the battlefield (IPB), and the unit's current location as reported through the intelligence system. During offensive operations, friendly unit deltas are normally the first indicator that a decision may be necessary to keep the concept of operations on track. During defensive operations, the enemy unit deltas tend to trigger the decisions.

3.1.2.2 *Situational Delta(s)*

With respect to units, the situation delta is the difference between the unit's current situation (to include current tactical activity and current physical condition) and the expected unit situation at the time of the assessment. With respect to terrain and infrastructure, the situation delta is the degree to which one force or the other controls a location and whether that control was expected at the time the assessment commenced. With respect to weather and trafficability, the situation delta is whether the current weather or trafficability situation, or both, were expected at the time the plan was developed.

3.1.2.3 *Assessment Activities*

The actions taken by a decision-maker or staff assistants, or both, to determine information relevant to tactical deltas and situation deltas with the intention of deciding to maintain the status quo, or issue an order directed at achieving a specific result. Assessment activities include determining ranges, line of sight, current effectiveness, effects of weapons fires, time-distance factors, strength, sustainment, force ratios, culminating points, control of key terrain and infrastructure, etc.

3.1.2.4 *Critical Indicators*

Critical indicators consist of information received during current operations which conveys the degree of progress in accomplishing one or more of the following: (1) commander's intent, (2) the unit's restated mission, (3) the commander's concept of operations, or (4) tactical tasks assigned to subordinate elements. The information has two parts. Part ONE is the recognition that the unit(s) comprising the delta(s) and its/their associated activities **could have** an impact on the current plan. Part TWO is the determination of which part(s) of the current plan (or situation) **is/will be affected**, and **how** it will be affected. This gathering and processing of information establishes the framework within which the decision-maker completes his assessment of the situation and commences his decision.

A special category of Critical Indicator involves invoking a commander's stated guidance, criteria, or standing operating procedures (SOP). These situations arise when the activity assessment related to a BLUE tactical delta indicates the unit, or another unit is in danger and the SOP must be applied; or the unit is violating the SOP and must be stopped. These are essentially sub-sets of the overall plan but frequently are not specifically included in the plan. For instance, unit SOPs forbid firing on a target if a friendly unit is within "danger close" of the target for the particular type of munitions requested in the fire mission. Figure 2 on the following page outlines the four definitions.

Tactical Deltas	
Operational Indicators *(With regard to assigned mission)*	***Delta's vis-à-vis the Intelligence Estimate or the OPORD*** *All Units in AO ~ Enemy and Friendly* *[Estimate of the enemy units' tasks is based on the Intelligence Estimate and IPB]*
Unit Locations	▪ Expected location, **unexpected** location, still undetected (enemy unit only) ▪ At location ahead/ on time/ behind schedule
Situation Deltas & Assessment Activities: validate or determine or both . . .	
Intelligence	▪ Validate / update combined events template ▪ Validate / update current enemy SITTEMP
Elements of the Current OPORD	▪ Validate / update DST and Synchronization Plan ▪ Validate whether the enemy tactical delta is an HPT
Communications	▪ Radio and data networks: working, not working ▪ EA: Under enemy attack; we are attacking enemy
Movement	▪ Faster / equal to / slower than expected ▪ WRT projected timelines: ahead/ on time /behind
Employment of Weapons	▪ In range / not in range ▪ Have line of sight / do not have line of sight
Effects of Weapons	▪ Greater / equal to / less than expected
Indirect fire	- do -
Obstacles	- do -
Direct fire	- do -
Non-lethal fires	- do -
Time	▪ Earlier/ equal to /later than expected ▪ More than enough / enough /not enough time
Strength	▪ Greater / equal to /less than expected
Sustainment	▪ WRT materiel and line haul capability: ▪ More than enough / enough / not enough
Combat Effectiveness	▪ Greater / equal to /less than expected
Culminating Points	▪ Well below / Approaching / at / past culminating point
Terrain & Infrastructure Key Terrain Avenues of Approach/ Movement Corridors Obstacles Routes, Bridges & Related Infrastructure	▪ Key Terrain: Enemy controls/ not controlled /we control ▪ AA & MC: Enemy controls/ not controlled /we control ▪ Obstacles: Defense—in place/not in place Offense—breached/not breached ▪ Routes, etc.: Adequate/not adequate Enemy controls/ not controlled /we control
Critical Indicators: . . . considering the deltas, which of the following remain viable, are uncertain, or are in jeopardy?	
Higher Commander's Intent	
Command's Restated Mission	
Commander's Concept of Operations	
Task(s) (and purpose) assigned to subordinate elements	
Specific Guidance, Criteria, or Standing Operating Procedures	

Figure 2. Tactical and Situation Deltas, Assessment Activities, Critical Indicators

3.1.3 *“Battle Captains” and BOS Officers*

The tactical deltas, situation deltas, assessment activities, and critical indicators outlined in Table 1 cut across all battlefield operating systems. One of our major recommendations is that generic standing operating procedures be developed for the monitoring, assessment, and decision activities during current operations. The impetus for this recommendation arose, in part, from observations of the actions by staff officers (to include “battle captains” [10]) during the AWEs.

The study team observed that the key staff officers were generally helpful to the commander during the monitoring and assessment phases, but that no common method could be discerned in the manner in which the staffs supported their commanders. The team made several observations during the third AWE that suggested the requirement for development of a generic standing operating procedures for monitoring, assessment, and decision activities. The third AWE was the annual execution of a year-end command post exercise (“Prairie Warrior 1998”, or PW98) at the U.S. Army Command and General Staff College. Because the commander and staff roles at each echelon—corps, division and brigade—were filled entirely by officer students, the decision-making environment was not as realistic as similar echelons in regular Army commands. Nonetheless, the decision events were illuminating, and have contributed to our understanding of the process.

Most decision situations during PW98 unfolded in a manner that the officers generally described as “familiar.” In each of these cases, the officers playing staff roles easily supported the commander during the assessment phase with timely comments relative to the employment of the battlefield operating systems (BOS). In several situations, however, the events on the battlefield were either relatively more complex than the officers had experienced in past exercises, or were genuinely unusual, and were considered to be “unfamiliar.” In these cases, the officers playing staff roles became silent, and were much less effective in providing recommendations with respect to the employment of the brigade’s battlefield operating systems. In effect, the commander was on his own as he assessed the situation and made his decision.

The staff behavior provided a valuable insight that would not otherwise have been gained. The lesson is that generic standing operating procedures should be developed specifying recurring tasks to be performed by the staff during the monitoring, assessment, and decision phases of each decision cycle. In effect the recurring assessment tasks performed within each battlefield operating system are like “battle drills.” They are intended to ensure the staff continues to function effectively regardless of the uniqueness of the situation, and they are specifically intended to ensure the commander receives the clearest picture possible as he weighs his

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[10] During the first AWE (the FORCE XXI DAWE), both brigade commanders employed “battle captains” in their TOCs to keep the current operations displays as up-to-the-minute as possible. The battle captains also relayed to higher headquarters relevant information on the brigade’s sub-ordinate unit locations. In effect, their purpose was to facilitate the monitoring function. Possessing detailed understanding of the current operations order and the timelines, they were very instrumental in identifying tactical deltas. Once the tactical deltas were identified, the assessment activities tended to involve the functional staff officers—fire support, air defense, combat engineers, etc. The battle captain function was not used during the third AWE (the annual Prairie Warrior exercise at the U. S. Army Command and General Staff College) largely because the number of officers available to man the command groups was too small. The second and fourth AWEs were executed at the battalion task force level and tested TOC reengineering concepts that precluded “battle captains,” as such. The C3I system for these two AWEs was designed such that the key staff officers fulfilled both monitoring and assessment functions full time.

decision. We will elaborate on tactics, techniques, and procedures (TTP) for TOC operations following discussion of the Integrated Cognitive Model. Before moving to the Integrated Cognitive Model, it is useful to relate the decisions made during current operations to the decisions made during planning.

3.1.4 *Mental Image of the Relationship of Planning Decisions to Current Operations Decisions.*

Figure 3, on the following page, is the third element in the group process model. It depicts the fact that decisions made during planning are essentially the start point on the path to achieving the higher headquarters commander's end state, and that elements of the plan will, or may have to be changed during the execution of the plan due to unforeseen future events. Moving down the left side, the figure portrays that a plan prepared using the MDMP is ***conceptual*** in nature. The concepts are embedded in the sum of the tasks assigned to subordinate units, and in the synchronization of those tasks. The concept of operations, an outgrowth of one of the COAs considered during planning (that is, one of the operational ***concepts***), will have a ***structure*****—**as described in the COA Development step in FM 101-5. The structure includes a main effort, a supporting effort, a reserve; and missions and priorities assigned to combat support and combat service support elements. The wargaming and BOS synchronization effort by the commander and staff during the planning result in an essentially "interdependent" plan. Thus, during execution, the object is to keep all of the pieces of the plan functioning as they were designed to do.

At the bottom of the left side of the figure, the rehearsal is complete, and the unit is ready to commence execution. The small rectangles on the right side show a series of notional decisions. Each symbol is intended to represent the group process in a single decision as outlined in Figure 1. The commander can expect to make a series of decisions from the start of execution until the unit accomplishes its assigned mission. Soldiers innately understand that the situation during execution will be dynamic, and that decisions will, or could, range across each element in the plan's structure. The reality is that although the basic plan is intended to be flexible, it is also a matrix of interdependent unit tasks and responsibilities. Thus when one or more subordinate units is given new or amended tasks, the commander and staff need to be thorough in assessing which other assigned tasks may need to be changed or modified. Each subordinate commander, in turn, even though not directly affected by the change, needs to assess whether or not the change will affect his assigned task(s), and needs to adjust accordingly.

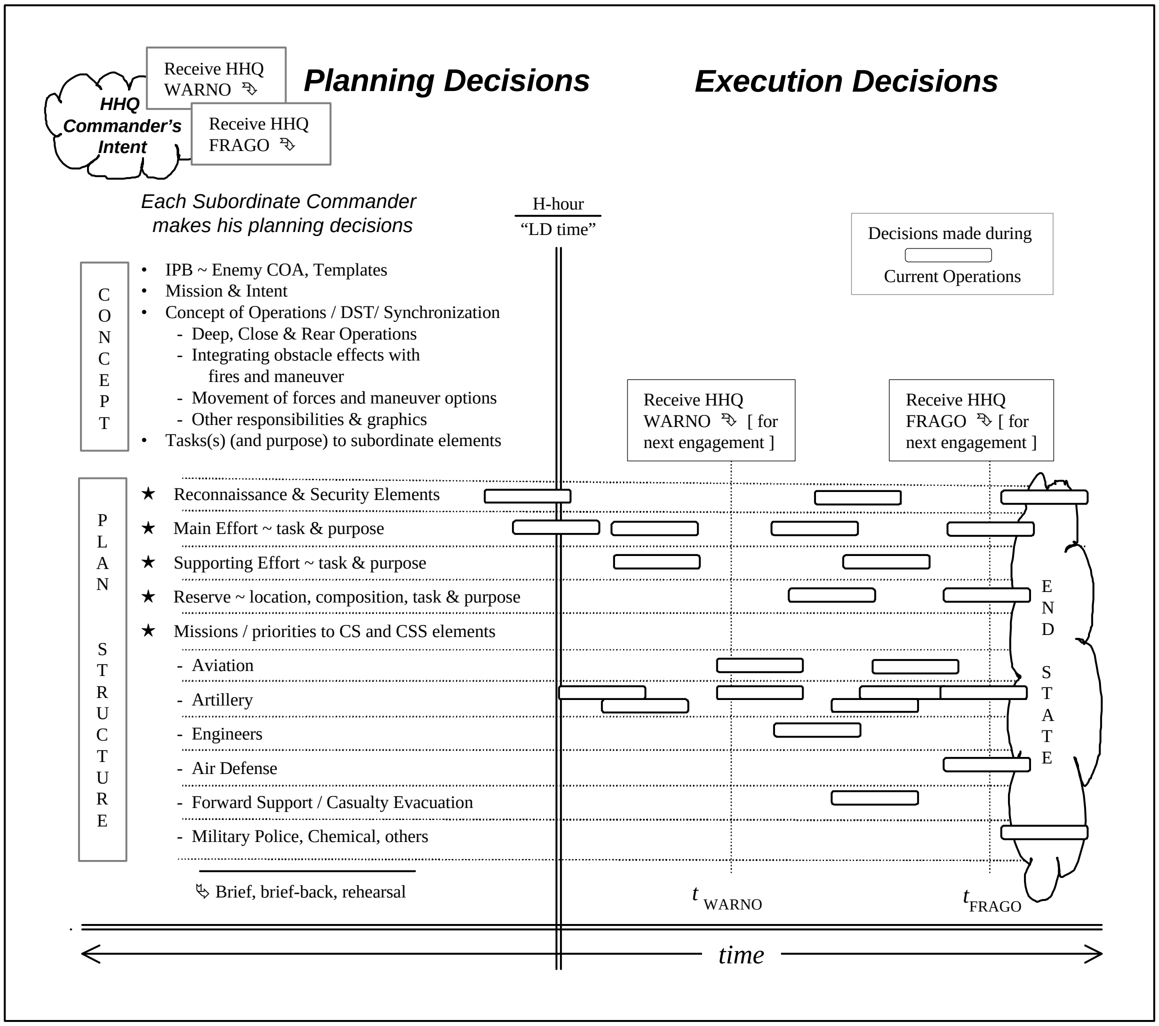

Figure 3. Planning Decisions Set Stage for Execution Decisions

Almost all current operations decisions are made following the process outlined in Figure 1. The process has significant cognitive elements as described in the "Cognitive Engineering of the Human-Computer Interface for ABCS" report. It also has significant potential to be made more efficient and effective through a series of battle drills tailored to the characteristics of the situation. The battle drills should be organized around the "monitor-assess-decide" process where the heart of the drill is the series of assessment activities performed by the staff to assist the commander in reaching a decision.

3.2 *Integrated Cognitive Model*

As mentioned earlier, the main effort of the ARL study was to "develop a descriptive [cognitive] model of the decision making process at brigade level . . . address critical event-driven issues and information needs . . . and time stress."[11] Not stated, but clearly implied, the model was to focus on decision-making during current operations.[12]

The cognitive psychologists participating in the study, Dr. Dennis Leedom (ARL) and Dr. Leonard Adelman (George Mason University), had participated in a number of military studies over a lengthy period. Both understood the origins and the roles of doctrine and training in preparing units for combat. Also, both were very familiar with the major writings in the evolving field of organizational psychology referred to as "naturalistic decision-making (NDM)."[13] With this background, both understood that no single model would be adequate to describe the relatively complex cognitive processes at work during current operations decision-making. In effect, they tacitly recognized that in a military environment, even decisions made during a rapidly changing situation (sparked by unforeseen enemy initiatives) were significantly influenced by a decision-maker's long immersion in his military culture.

3.2.1 *Framing the Study*

As the ARL Program Manager-Cognitive Engineering, Dr. Leedom had identified six decision-making models for consideration prior to the study commencing. Dr. Adelman recommended including one additional model to account for on the effect of "uncertainty" in decision-making. After observing a series of Army Advanced Warfighting Experiments (AWE) in late 1997 and early 1998, Dr. Adelman and Dr. Leedom agreed that on the basis of their prior experience, and their observations during the AWEs, the descriptive model should contain the strongest features of four NDM decision models. The four are:

1. Beach's Image Theory (1993)
2. Rouse and Valusek's model of decision processes (1993)
3. Klein's Recognition-Primed Decision (RPD) Model (1997)
4. Lipshitz and Strauss's "Coping with Uncertainty" Model (1997) [14]

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[11] The study actually had six major objectives, the cognitive model of decision-making was the first among equals.
[12] The following comment is taken from Leedom, et. al., 1998: "Cognitive science literature contains many models of human decision-making. The interested reader is referred to Andriole and Adelman (1995) for a review of this literature, and Goldstein and Hogarth (1997), Klein, Orasanu, Calderwood, and Zsambok (1993), and Zsambok and Klein (1997) for anthologies."
[13] Naturalistic Decision Making (NDM) has a short and a long definition. Both are provided here. "NDM is the way people use their experience to make decisions in field settings." Also, "the study of Naturalistic Decision Making (NDM) asks how experienced people, working as individuals or in groups in dynamic, uncertain, and often fast-paced environments, identify and assess their situation, make decisions and take actions whose consequences are meaningful to them and to the larger organization in which they operate." (Zsambok, et. al., 1997).
[14] Lipshitz and Strauss label their model "Coping with uncertainty: The R.A.W.F.S. heuristic hypothesis." We refer to it here as simply the "Coping with Uncertainty" Model.

In their broad outlines, the four models address essentially the same major elements of decision-making, but in varying degrees of emphasis and in slightly different language.[15] In effect, and as described below, each model emphasizes one or more different areas within the broad framework. Before turning to the integrated cognitive model, it is useful to comment briefly on each of the models which are built into it.

3.2.2 *Beach's Image Theory*

Beach identifies three levels of cognitive images, and says they are at work in all decision making situations. The three are the **value** image, the **trajectory** image and the **strategic** image.[16] Here, we attempt to describe Beach's images in the context of the military terms to which they pertain.

Beach's Image Theory describes in greater granularity than the other NDM models the relationship of the decision-maker's military education and earlier experience to his or her thought process when making a decision during current operations. These experiences are the basis of the decision-maker's "value image." Beach explains that the decision-makers "values" are at work during the decision process. For instance, we believe the AAR process mentioned earlier contributes significantly to an officer's or non-commissioned officer's value images.

Beach also explains that the component pieces of the formal planning process—such as commander's intent, the mission, the tasks (specified, implied, and essential) assigned to the unit—are essentially the goal(s) of the operation or the "trajectory image." In effect, the trajectory images are what the commander has been assigned to accomplish by his superior.

The commander's own plan to accomplish the trajectory images; that is, the intent he issues to his subordinates, his concept of operations, the tactical tasks he assigns to subordinate units, and his IPB products, are his "strategic images."

Again, the importance of Beach's Image theory" is that it explains to a greater degree than the other NDM models the function of the decision maker's military education, experience, and the function of the formal planning process in creating a cognitive framework for current operations decisions.

3.2.3 *Rouse and Valusek's Decision Model*

Rouse and Valusek emphasize three areas: (1) execution and monitoring, (2) situation assessment, and (3) planning and commitment. Their emphasis on monitoring is particularly congruent with the constant monitoring activities in military command posts. They point out that monitoring involves evaluating deviations from expectations, and deciding whether or not the deviations are serious enough to implement corrective actions. Experienced decision-makers

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[15] Each model tends to reflect insights gained by their authors in the process of observing decision-making in a series of professional and vocational environments. This process of developing a general model to explain decision-making "in general" leads to a model that will not adequately describe the decision-making milieu within a specific profession, particularly the "profession of arms," with century's of academic effort to understand its nature and improve it's application.

[16] The strategic image is actually the lowest level of the three. Persons accustomed to the military taxonomy of strategic, operational and tactical levels will find Beach's inversion of the terms unusual initially.

require little deliberation to determine whether the deviations are acceptable or not. The situation is frequently such that deviations, to the degree they exist, are within acceptable limits of the expectations, and a decision is not necessary. Related to the design of visual displays and decision tools in ABCS, Rouse and Valusek point out that visual displays "for supporting execution and monitoring "should be such that humans need not consciously seek and utilize information." The implication is that where possible, systems should be designed to alert the monitoring personnel when a deviation is approaching a limit.

3.2.4 ***Klein's Recognition Primed Decision (RPD) Model***

While the field of naturalistic decision making is greater than the sum of the insights captured in the RPD Model, RPD is certainly the catalyst around which the field of NDM has coalesced. RPD is an important contribution to the understanding of military decision-making during current operations.

RPD was developed and successively refined on the basis of observing expert practitioners from a variety of occupations making decisions in field situations, that is, conditions that a military person equates to current operations or the execution phase of an operation. Klein and his colleagues noted that the decision-makers decided the actions to be taken not on an analytical decision process—formulate options, then assess and decide among the options—but essentially by identifying a single best course of action, and modifying it as necessary. The identification of a COA is prompted by recognizing from past experience that certain patterns are unfolding in the current situation. In effect, a more experienced person, having seen many more situations, would be more effective in this situation than a novice or less experienced person. An RPD decision is much more complicated than that, of course, but a discussion of the cognitive elements of the RPD model is beyond the scope of this paper. See Appendix A for a graphic (without description) of the RPD model. Suffice to say, military persons unfamiliar with the RPD model itself will probably recognize that the great majority of decisions they have witnessed in operations centers during current operations are "single best course of action" decisions. Situations rarely afford the time necessary to conduct MDMP analytical decision-making.

As robust as the RPD model is, however, it tends to pick up the decision process at the point in the operational continuum where the decision maker and his or her staff "experience the situation in a changing context." In effect, RPD begins with the decision-maker already monitoring the situation and beginning to discern activities that are not consistent with his plan. The model describes the cognitive activities in the decision process, and ends when the decision maker "implement(s) (the) course of action." Again, the experienced military person senses that much more goes into current operations decision-making, and for this reason, the Integrated Cognitive Model includes complementary NDM models which emphasize the missing pieces.

The last missing piece is the effect of uncertainty in military decision-making. RPD and the two earlier models acknowledge that uncertainty is present in decision making, but they do not decompose the problem as thoroughly as the Lipshitz and Strauss model.

3.2.5 *Lipshitz and Strauss's "Coping with Uncertainty" Model*

Recognizing that uncertainty is a major factor in most current operations decision situations, Dr. Adelman and Dr. Leedom decided to include in the integrated cognitive model the salient features of the Lipshitz and Strauss "Coping with Uncertainty" model. The model is particularly appealing because it was developed based on a study of 102 Israel Defense Force officers involved in military decision-making situations. In describing their model, the researchers emphasized the different strategies unit leaders use to deal with uncertainty. They describe three principal types of uncertainty and five general tactics that the officers used to cope with them. Their model creates a far more robust framework within which to assess uncertainty related to the amount and the nature of information available on the enemy situation. The Lipshitz and Strauss model is considered to be consistent with RPD. See Appendix B for a graphic (without description) of the "Coping with Uncertainty" model.

3.2.6 *Diagrams of the Integrated Cognitive Model*

Dr. Adelman proposed a strawman model which linked the emphasized elements of the four cognitive models into a single composite. The strawman was successively refined over a period of several weeks—with both researchers reflecting on, and discussing refinements to the model in the context of specific observations they had made during the AWEs. The final product is the Integrated Cognitive Model, Figure 4, on the following page.[17] In its current form, the model contains too much detail to display clearly in the format for this paper. For this reason, and in order to provide a readable graphic, the model is divided into Figures 5 and 6, the right and left lobes of the model, respectively.

[17] In the ARL report, the Integrated Cognitive Model is referred to as the "Execution Decision Cycle."

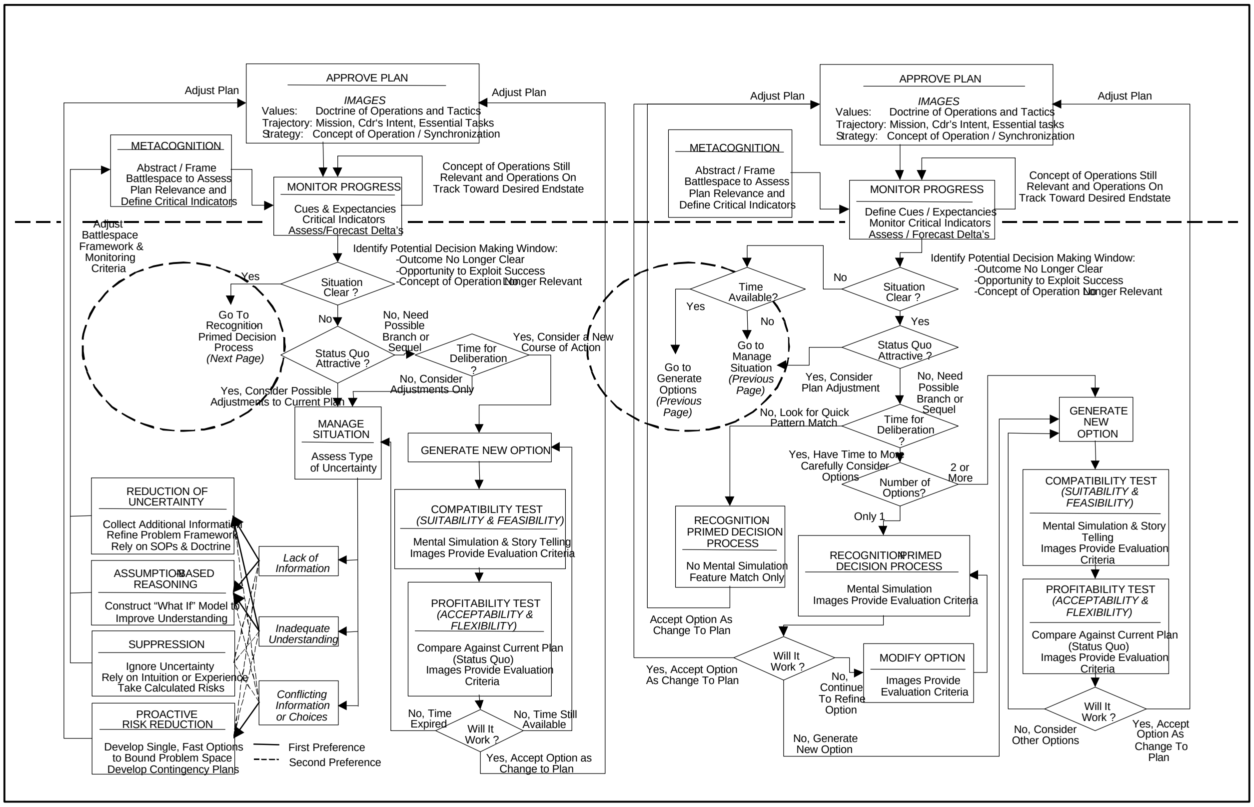

Figure 4. Integrated Cognitive Model

We have added an intermittent dashed line across the figure and two small dashed ovals to facilitate describing the integrated pieces. Above the dashed line are Beach's Images and framing concepts as well as Rouse and Valusek's monitoring component. The right lobe of the model contains key elements of the RPD model. The left lobe contains the essential elements of Lipshitz and Strauss's "Coping with Uncertainty." In the lower right corner of both lobes are Beach's compatibility and profitability tests. These cognitive tests are similar to three of the five "course of action criteria" described in FM 101-5: suitability, feasibility, and acceptability.[18] While a discussion of the cognitive process is beyond the scope of this paper, the reader should be able to follow the flow without difficulty. Leedom, et. al., 1998 contains a detailed description of the cognitive flow through the model.

[18] The five COA Criteria are suitability, feasibility, acceptability, distinguishably, and completeness

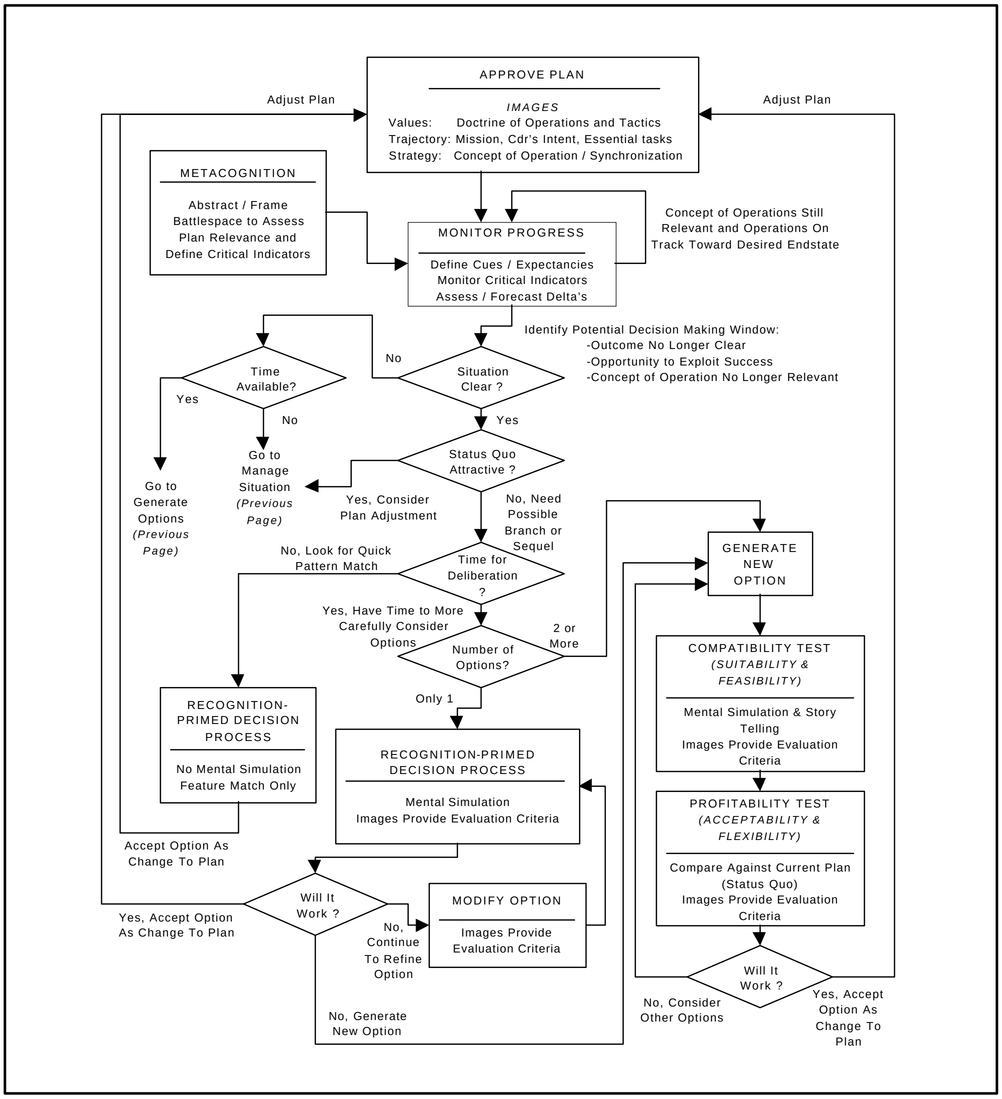

Figure 5. Right Side of Integrated Cognitive Model

Notice in the "Recognition-Primed Decision Process" block in Figure 5 (in the lower left quarter), the researchers did not reproduce the detailed flow of the actual RPD schematics. The most current RPD diagram is depicted in appendix A (without the narrative description). Similarly, as can be seen in the following figure, the researchers did not include the detailed Lipshitz and Strauss schematic. The "Coping with Uncertainty" model is depicted in Appendix B (again, without the narrative description).

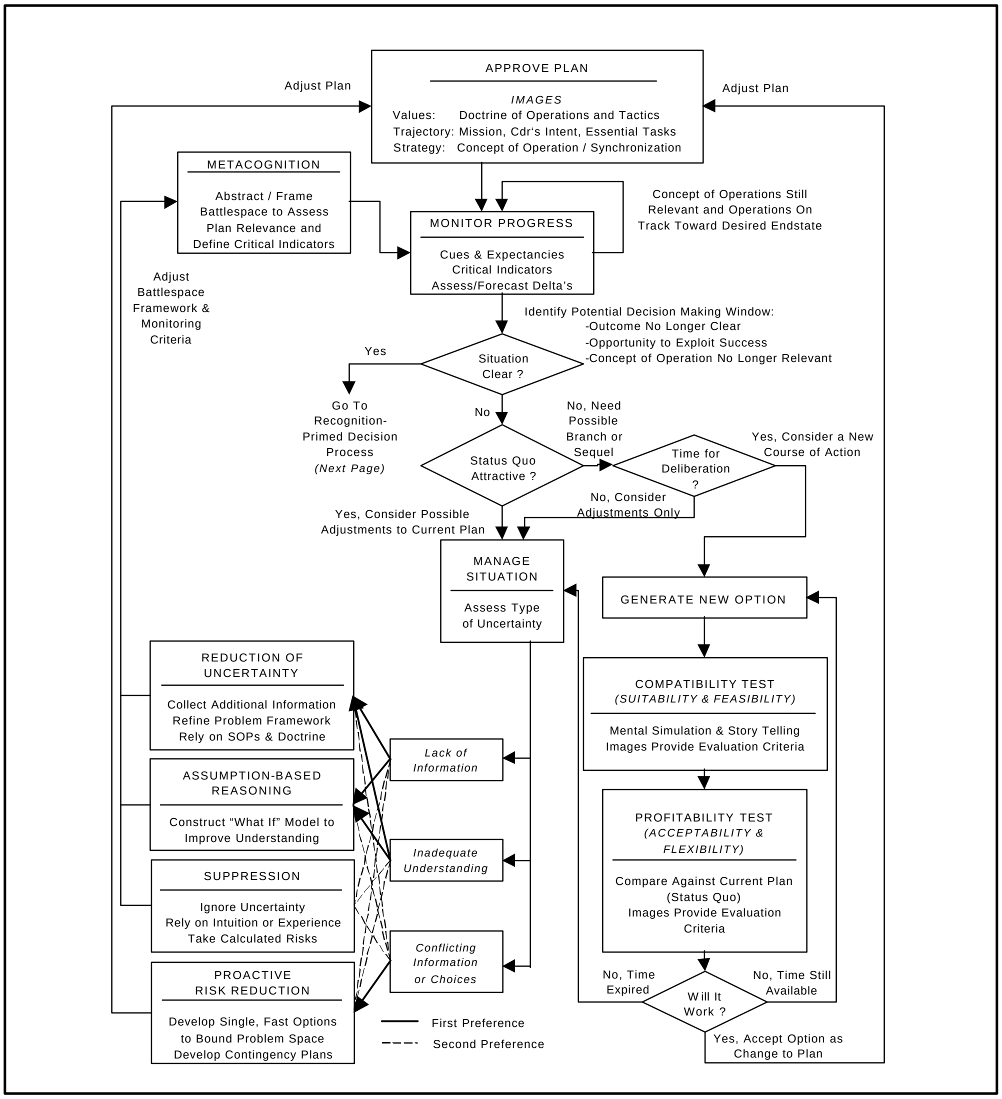

Figure 6. Left Side of Integrated Cognitive Model

To be clear, the relationship of Figure 4, the Integrated Cognitive Model, to Figure 1, the Commander-Staff Group Process Model, is that Figure 4 depicts the cognitive activities in the mind of the commander, not necessarily the dialog between the commander and his staff. Figure 1 simply outlines the flow of the current operations decision process from monitoring activity to the commencement of execution (which, in turn initiates another cycle of monitoring activity). Arguably, a similar process is also at work in the minds of the key staff members.

A major benefit of the integrated cognitive model is that it explains in a persuasive way the circumstances under which a commander–driven single COA is not only an acceptable method of reaching and refining a decision, but also a prudent method. The model buttresses a similar conclusion in an earlier ARI study of decision making during the planning phase of an operation [Fallesen, *et al.*, 1992]. While experienced leaders have always recognized the necessity of the single COA decision, until this point, Army doctrine has been slow to embrace the idea of a single COA. Perhaps the cognitive integrated model will be the catalyst to the articulation of TTP for single COA decisions

This report stops short of a detailed description of the integrated cognitive model. Again, Leedom *et al*., 1998 contains a detailed discussion of the flow through the model.

The ARL study did not progress beyond the integrated cognitive model. At the time the study concluded, it was clear to each participant that the cognitive model opened the door to understanding the dynamics of decision making, and posed numerous questions how to improve decision making during current operations. It was clear that to enhance decision making activities with a command group, it would be useful, indeed, necessary to study the cognitive implications of the decision process on the staff members as well as the commander. During the AWEs, the team observed a sufficient number of examples of weak staff support that the issue of improving staff functioning during current operations became as intriguing as improving the commanders' ability to make sound decisions.

It is reasonable to assume that the more organized the staff is in collectively monitoring and assessing the situation(s), the better prepared they are to provide brisk, focused input to the commander as he assesses the situation and makes his decision. The goal is to provide the clearest possible picture of the situation. The assessment includes, in part, the tactical deltas, the situational deltas, and the critical indicators. This assessment underlies the functional content of the estimates and recommendations each staff member provides the commander.

3.3 *Tactics, Techniques, and Procedures for Decision Making During Current Operations*

As mentioned earlier, it is interesting to note that while the Army has a rigorously developed doctrinal process for decision-making during the planning phase of an operation, no such procedures exist for decision making during current operations. In part, this is directly related to the deeply ingrained value that a commander should not be hobbled by higher headquarters telling him how to do his job. It may also be related to the fact that until recently, little effort had been invested in understanding the piece parts of current operations decision-making. We salute the idea that the commander should have as much freedom of action as possible to accomplish his mission. At the same time, we also believe that it is time to develop generic tactics, techniques, and procedures (TTP) with which a commander and staff could train to effectively monitor, assess, and develop (or refine) single or multiple courses of action during fast-paced current operations. This is not to impinge on the time-honored prerogatives of the commander. It is essentially to provide a set of thoroughly researched "best practices." TTP are developed for virtually every other facet of military group activities.

3.3.1 *An Approach to the TTP for Current Operations Decision Making*

The combinations and permutations of situations that the commander and staff will be monitoring are very large, if not infinite. For this reason, the TTP need to have a balance of structure and flexibility. The sequence of activities probably would not always be the same. Different situations would call for different sequences of staff interactions and information flow to the commander. One approach to organizing basic sequences for the TTP could be built around the degree of contact with the enemy at the time the assessment begins, and proximity of friendly forces to the enemy units. For instance, nine broad situations oriented to conventional operations which might suggest a different sequence of assessment activities are:

1. No significant shaping fires currently in progress, no ground maneuver contact imminent.
2. Significant shaping fires currently in progress (including fires on high payoff targets), but no ground maneuver contact imminent.
3. Suppression of enemy air defenses (SEAD) in progress.
4. Friendly units are under attack by enemy indirect fire, attack air, or enemy SOF, or combinations of the three.
5. Friendly units are under attack by enemy maneuver units supported by indirect fire or air, or both.
6. Ground maneuver units (or other units) now in direct fire contact with the enemy.
7. Counter-reconnaissance situation.
8. Counter-battery fire situation.
9. Enemy forces detected in rear area / attacking C2 facilities, CSS units, or other vital infrastructure.

The TTP might reasonably include actions by the staff to quickly apprise the commander of the following. The sequence and selection of items reported might vary depending on the situation. The following is a brief list of information to be quickly determined and shared among the commander and other BOS officers:

A. Current enemy situation template with known, unknown, and templated units (in the immediate vicinity of the area of assessment)
B. Current status of communications – voice and digital – to include friendly and enemy electronic warfare operations / effects
C. Range to or distance between key friendly and enemy units
D. Line of sight / intervisibility / observation points
E. Speed of moving units and time of closure at designated point(s)
F. Available avenues of approach / movement corridors
G. Current strength, friendly and enemy (in the specific situation) / force ratio
H. Level of indirect fire effort needed to reduce enemy forces to “x” % of strength
I. Assets required / time necessary to emplace “block, turn, disrupt, delay” obstacles
J. Conversely, assets required / time necessary to breach / bridge obstacles
K. Optimum location and window to rearm/refuel

The TTP for commander and staff actions in a TOC during current operations decision-making are related to the procedures required in the Combat Information Centers of AEGIS cruisers and in the air command and control spaces on board an AWACS aircraft.[19] Both of these environments have been studied in considerable detail, and arguably with the effect of increasing the effectiveness and efficiency to the commanders and their staffs.

3.3.2 *Relationship of the Integrated Cognitive Model and TTP to the OPFOR Doctrine and IPB*

The enemy forces used in each AWE were Soviet style forces. As a consequence, the intelligence officers were presented robust enemy situations and had the opportunity to use many of their MOS skills. IPB techniques, when used, enabled the intelligence staffs to portray clear visual images of enemy capabilities and intentions. Superimposing BLUE force plans over the IPB templates—and updating the graphics with the reported locations of RED and BLUE units—created both visual and mental deltas between the forecasted enemy plan, the friendly plan, and perceived ground truth as reported through the C3I system. Given this visualization, the commander, with input from the staff completed his decision, then issued it.

The ability to visualize the BLUE and RED force dynamics is an essential element of the decision-making process. Visualizing the BLUE force is relatively uncomplicated. Operational graphics have long provided the capability to draw a picture of an intended course of action. Graphic techniques to visualize the RED force are more problematical. Until the advent of IPB in the late 1980s, intelligence officers had essentially no doctrinal tools to describe and continuously update a coherent picture of the enemy's capabilities and intentions. Current IPB techniques are limited to Soviet style ground forces only (although an imaginative intelligence officer can tailor the templates to any other conventional force if that force's doctrinal publications are available).

The point is that the combination of OPFOR doctrine and related IPB templates, combined with operational graphics techniques to represent BLUE and OPFOR plans and current situation, underscore the relevance of Beach's Image Theory to military decision making. Image Theory explains (to an extent) and validates the Army's effort to develop OPFOR doctrine for specific types of operations. And as outlined in the integrated cognitive model, for optimal effectiveness in decision making, the commander must have a coherent image of the enemy situation.

3.4 *Not Yet Addressed: Operations Other Than War*

The foregoing discussion has been framed entirely in the context of conventional operations. Conventional operations are what we know most about. We are comfortable with them. They are the model against which we organize, equip, and train our armed forces. As DESERT STORM attests, the nation is prudent to prepare for such operations. But, we also send Joint Task Forces off to other contingencies, to "operations other than conventional" that is, "operations other than

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[19] A cardinal principle of command is that the commander must "move to the sound of the guns," that is, move to locations on the battlefield where he can best control and influence the outcome of the engagement or battle. For this reason, commanders are not expected to remain in their tactical operations centers (TOC) at all times. This poses a dilemma for the commander. Normally more information on the overall operation is available through the C3I system in the TOC than through the pieces of the C3I system the commander is able to take with him when he moves from the TOC. Ideally, the TTP would be designed to support decision-making when the commander is influencing the action at another point on the battlefield.

war." Arguably, we have still not discovered how best to train our forces for success in these operations. With respect to training for OOTW, we believe the Services need to adopt the techniques proven in training for conventional operations. A major factor in this success is the Army fostering the understanding of the OPFOR, and visualizing how he fights.

3.5 *OPFOR Doctrine and IPB-Like Techniques for Operations Other Than War (OOTW)*

No OPFOR doctrine for the various forms of Operations Other than War (OOTW) exists at the present time, and as a consequence, neither do IPB-like techniques exist to facilitate the visualization of OOTW threat forces. The fact that neither exist is not surprising. OOTW encompass more than a dozen types of contingencies. Joint Pub 3.0, *Joint Operations*, provides an overview of the specific types of OOTW contingencies, and other Joint Pubs describe joint doctrine for each in relatively greater detail. Figure 7, extracted from Joint Pub 3.0, lists the full range of contingencies across the "spectrum of conflict." The table also categorizes the essential nature of the operations and highlights the U.S. goal in undertaking them. The table lists more than a dozen types of operations to be planned and executed by unified commands and joint task forces. Currently, the only types of operations for which the U.S. ground forces have appropriate hypothetical OPFOR forces around which to build plausible scenarios for training, and then to integrate realistic intelligence participation during the training, are the "Large-scale Combat Operations" and the "Attack/Defend/Blockade" lines. These exist because of the effort the Army has devoted to developing the FM100-6x series of training support manual.[20] The detail in this series of manuals, when applied with skill both by the exercise design staff and the intelligence staffs participating in an exercise, adds immeasurably to the fidelity of the simulation and the overall effectiveness of the training. The reality, however, is that many U.S. contingency missions require the operations listed below the double line in Figure 7.

Range of Military Operations				
Military Operation			*General U.S. Goal*	Examples
COMBAT		War	Fight & Win	Large-scale Combat Operations Attack / Defend / Blockade
COMBAT	NONCOMBAT	Operations Other Than War	Deter War & Resolve Conflict	Peace Enforcement / NEO Strikes / Raids / Show of Force Counterterrorism / Peacekeeping Counterinsurgency
	NONCOMBAT	Operations Other Than War	Promote Peace	Antiterrorism / Disaster Relief Peacebuilding Nation Assistance Civil Support / Counterdrug NEO

Figure 7. Range of Contingencies to Which U.S. Forces Can Expect to be Committed

[20] For instance, FM 100-60 Armor and Mechanized Based OPFOR Organization,
FM 100-61 Armor and Mechanized Based OPFOR, Operational Art, and
FM 100-63 Infantry Based OPFOR Organizational Guide

Presently, the materials available to facilitate exercise design and realistic intelligence participation in OOTW exercises is considerably less well developed, and to the degree high quality examples exist, they are not widely known to exist. Figure 8 summarizes our inquiries into the current inventory of OPFOR doctrine and IPB-like techniques across the range of U.S. military operations. At the present time, we could find no evidence of a formal effort to develop either doctrine or IPB-like techniques for any category of operations other than war.

<table>
<tr><th rowspan="2">Type of Operations</th><th rowspan="2">Examples of Recent Operations</th><th colspan="2">Army</th><th colspan="2">Joint</th></tr>
<tr><th>Threat Doctrine?</th><th>IPB ?</th><th>Threat Doctrine?</th><th>IPB ?</th></tr>
<tr><td>Large-scale Combat Operations</td><td>Desert Storm</td><td>Yes</td><td>Yes</td><td>Army only</td><td>Yes [21]</td></tr>
<tr><td>Attack / Defend / Blockade</td><td></td><td>Yes</td><td>Yes</td><td>Army only</td><td>Yes</td></tr>
<tr><td>Peace Enforcement / NEO</td><td>Bosnia</td><td colspan="4" rowspan="5">None</td></tr>
<tr><td>Strikes / Raids / Show of Force</td><td></td></tr>
<tr><td>Counterterrorism</td><td>Somalia</td></tr>
<tr><td>Peacekeeping</td><td></td></tr>
<tr><td>Counterinsurgency</td><td></td></tr>
<tr><td>Antiterrorism</td><td></td><td colspan="4" rowspan="7">None</td></tr>
<tr><td>Disaster Relief</td><td></td></tr>
<tr><td>Peacebuilding</td><td></td></tr>
<tr><td>Nation Assistance</td><td></td></tr>
<tr><td>Civil Support</td><td></td></tr>
<tr><td>Counterdrug</td><td></td></tr>
<tr><td>NEO</td><td></td></tr>
</table>

Figure 8. Availability of Generic Threat Doctrine and IPB-like Techniques for OOTW

Assuming a requirement was formalized to create the doctrine and techniques for OOTW, and given the range of variants within each type of OOTW category, the question is: how would a team approach the development of a generic OPFOR doctrine suitable to conduct training?[22] Clearly these are challenging tasks. If they were easy or even obvious, they would have been completed long ago. We shall address them one at a time.

3.5.1 *Developing OPFOR Doctrine for OOTW*

The approach would be to form a team comprised initially of a military historian, a ground operations subject matter expert, and a ground intelligence subject matter expert. Subsequently, other disciplines such as political science and anthropology might be added. Their tasks would be to identify a specific number of historical examples of the category of OOTW being studied.[23] The examples would include conflicts not involving the U.S. The team would disassemble each

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[21] Joint Pub 2-01.3 Joint Tactics, Techniques, and Procedures for Joint Intelligence Preparation of the Battlespace (JIPB) is currently at the preliminary coordination draft stage. The manual describes joint IPB techniques focused principally on conventional operations.

[22] Examples of variants within a category of OOTW would include:

Counterinsurgency: the British experience in Malaysia, the American experience in Vietnam

Peace Enforcement: the U.S. experience in Somalia, the U.S. experience in Bosnia

[23] The number to be identified and the criteria for selection are important, but can be determined later. Notionally, the team would need a large enough number that to ensure they were able to identify as many salient details across all segments of their inquiry as possible.

conflict attempting to identify the political, economic, religious, cultural, and social factors bearing on the conflict, and would identify the essential doctrine, tactics, techniques, and procedures of each protagonist.

The team would catalogue significant engagements and battles in each conflict, and would also attempt to understand how the OPFOR operated at the small unit level. A characteristic of OOTW is that the civilian population is generally present in the operational areas throughout the conflict. The team would attempt to identify the nature of the relationship of the population(s) within the operational area to the protagonists. Once the representative conflicts were disassembled, they would list every significant type of operation conducted by OPFOR units or individuals, and would attempt to describe the operational characteristics of each operation and the actual tactics. If possible, the team might also determine the frequency each type of operation was conducted. From this information, the team would build a composite OPFOR. Depending on the category of OOTW, the team would also develop one or more "gray" forces whose allegiance in a conflict could be swayed by enfolding events. The team would also have to describe composite political, economic, religious, cultural, and social groups.

The team would also have to look into the future to determine the probable impact of information technology on OPFOR capabilities. For this reason, it may be productive to include a "futurist" on the team at some point.

The OPFOR would be capable—under specific conditions—of conducting the full range of operations identified across all the conflicts studied. This process would produce an unrealistically capable and ruthless OPFOR. Thus, the specific conditions would be stated in the manual in such a way that commanders designing training events for their subordinate units could select the specific OPFOR capabilities for which they wanted their units to be prepared.

3.5.2 *Developing IPB Techniques for OOTW*

For a number of reasons, IPB for OOTW will be more challenging to develop than perhaps it was for conventional OPFOR. The reasons include: (1) OOTW OPFOR are generally indistinguishable from the populace, (2) they normally have strong support from elements of the populace, (3) time is frequently the ally of the OPFOR, and (4) OPFOR rules of engagement include acts of ruthlessness and savagery.

As noted above, OOTW tends to be characterized by a civilian populace continuing to live in the operational area throughout the conflict. Generally, the OPFOR is supported by elements of the populace. This support translates into security for the OPFOR, and intelligence infrastructure, and pervasive logistical support. Except during an OPFOR military operation (from the OPFOR's viewpoint), the individuals are, or can be indistinguishable from the populace. This means that unlike conventional, Soviet-style OPFOR units, which can be located on the battlefield using conventional reconnaissance, surveillance and intelligence techniques (to include analysis), OOTW OPFOR are more challenging to locate. His logistics tail is blended into the surrounding economy, and he has the ability to mass without the conspicuous signatures of regular forces moving from assembly areas, to attack positions, etc.

The degree of popular support that sustains the OPFOR, with the possible exception of counterdrug operations, is frequently based on strong religious or ethnic ties, or both. This type of support is very difficult to erode, and as long as it remains strong, for whatever reasons, the OPFOR will continue to blend easily into the populace. Popular support bears significantly on OOTW IPB. The challenge is to determine how it bears and how to represent it graphically in a way that supports decision making. The corollary to the popular support enjoyed by the OPFOR is the degree of popular support for the contingency at home in the United States. This bears indirectly on the IPB process insofar as it heightens the necessity for the IPB process to support force protection and information operations by the deployed U.S. force

The third reason is tied to the first and second. The OPFOR frequently has an advantage in time. To the degree the OPFOR continues to receive popular support, he has the advantage in initiating offensive actions at the time and place of his choosing. These actions are difficult to anticipate. Conventional IPB uses time phase lines (TPLs) to represent projected locations of OPFOR units along different avenues of approach. Representing OPFOR operations with respect to time in OOTW settings will require a more imaginative approach.

The final reason that IPB for OOTW is challenging is that the OPFOR is almost always ruthless, indeed, murderous to a degree that never fails to surprise U.S. senior leadership. Similarly, the degree of ruthlessness and its manifestation in OPFOR operations never seems to be understood at any level of command until one or more savage acts are discovered and fully reported by the media. Support from the American public for OOTW contingency operations is always affected by these acts. But the fact is, the OPFOR always operates by their own rules of engagement. The IPB techniques for OOTW must feature a means of anticipating ruthless acts by the OPFOR.

These four characteristics of an OOTW OPFOR suggest the current family of IPB templates will have to be modified significantly to provide the same level of visualization available in conventional operations.

3.5.3 *A Serious Task*

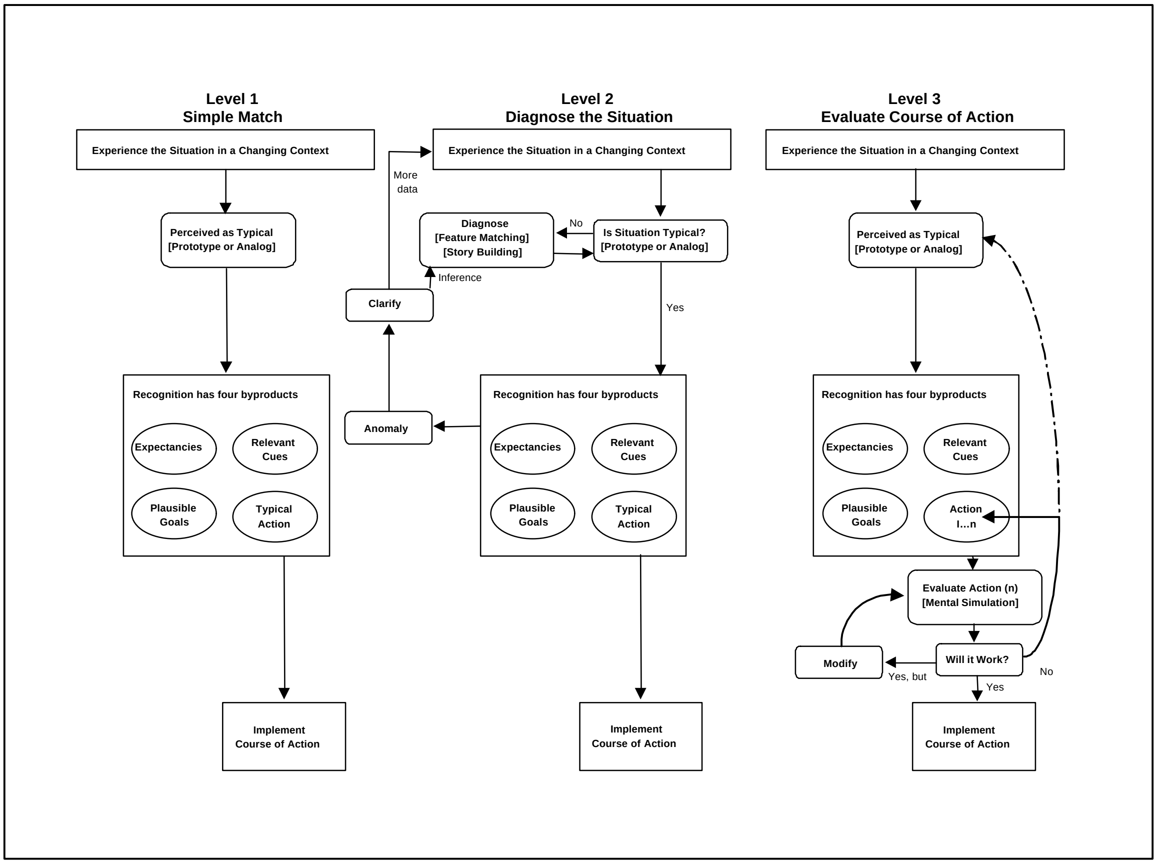
The effort to develop doctrine for OOTW OPFOR and corresponding IPB techniques is a serious undertaking. It is probably not feasible to attempt to develop the materials for each category of OOTW in the same time period. A better approach might be to develop the generic doctrine for no more than two categories initially. This will enable the lessons learned in the process to be passed to the teams conducting the subsequent efforts. Our recommendation is that the first two efforts be directed toward the peace enforcement and the peacekeeping categories. They are closely related, and considerable synergy would result from undertaking them together. The IPB development task should not be undertaken until the OPFOR doctrine task is well underway. It could commence as soon as the doctrine team develops its initial comprehensive list of historical operations.

4. **Conclusions**

The ARL study provides a comprehensive model of decision-making that accounts for the decision maker’s military education and experience (Image Theory) as well as the complex set of conditions leading up to the decision, and the detailed situation at the time of the decision. It explains the circumstances under which a decision resulting from a commander-driven single COA is highly acceptable and prudent. The study sets the stage for developing a generic set of TTP for commander-staff interaction during current operations decision making in Army TOCs. The study also generated the insight that the Services should take steps to develop OPFOR doctrine with which to design more realistic training for OOTW contingencies. Related to the OPFOR doctrine is the associated IPB techniques with which to more clearly visualize the OPFOR's capabilities and intentions. These IPB techniques are expected to be highly effective during actual contingencies.

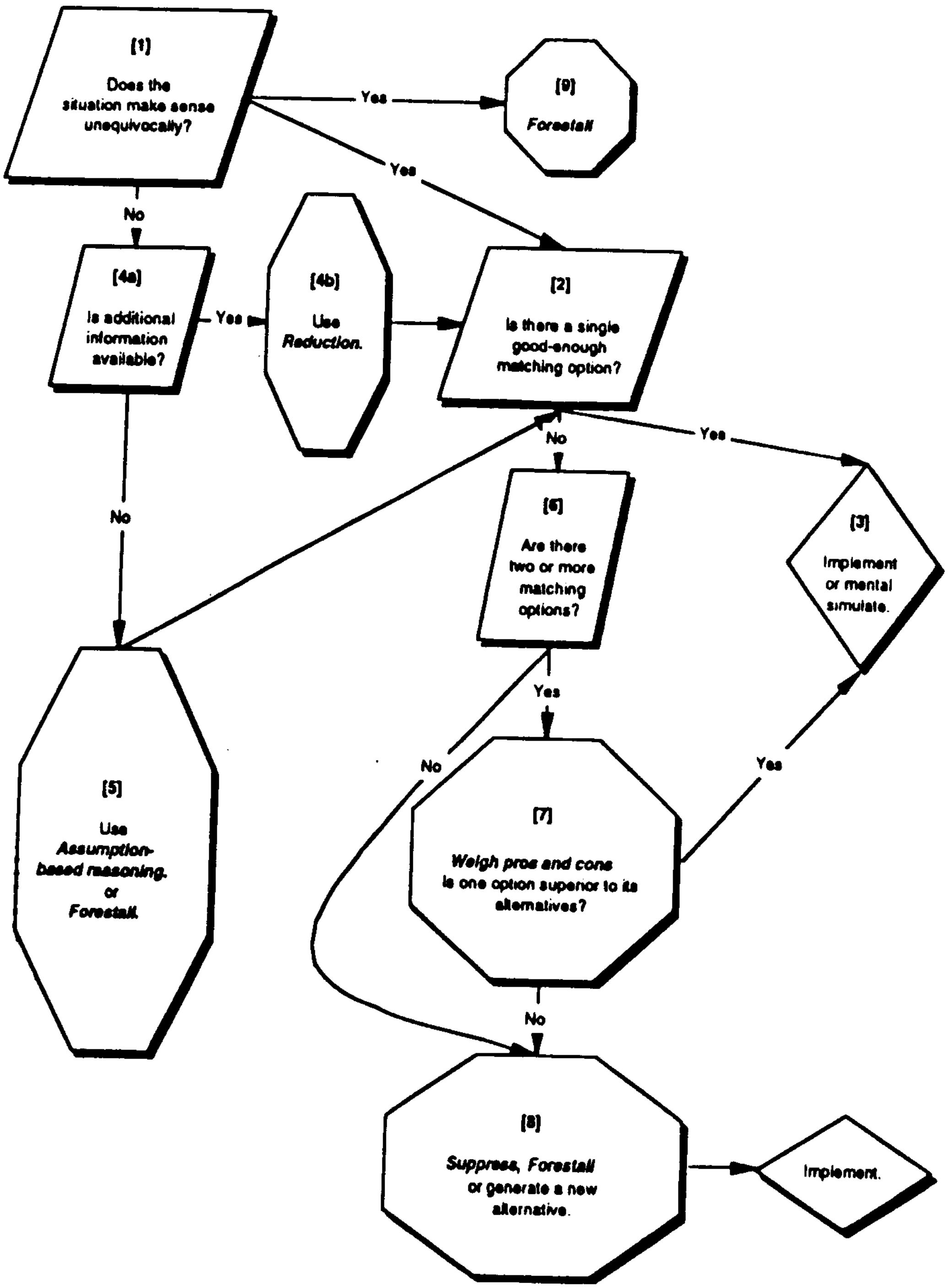
The ARL study should be seen as the catalyst for a number of Joint activities. First, studies should be undertaken of the decision making processes in Joint Task Force headquarters. The studies should focus not on the decision making during the crisis action phase, but during operations once the JTF is established in the crisis area. Second, the studies should lead to the development of TTP for commander-staff interaction during the conduct of planning and operations internal to the JTF headquarters. Finally, the Joint community should recognize the contributions the Army has made to battlespace visualization through their development of conventional OPFOR and the related IPB techniques for conventional operations. The Army should be encouraged to continue to develop these exceptional training materials and decision support tools for OOTW environments. The entire Joint community will benefit from the Army completing such an undertaking.

Appendix A



Klein’s (1997) Recognition-Primed Decision (RPD) Model

Appendix B



Lipshitz and Strauss' (1997) "Coping with Uncertainty" Model

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